



MILKEN INSTITUTE

## EXECUTIVE SUMMARY



# NORTH AMERICA'S HIGH-TECH ECONOMY

The Geography of Knowledge-Based Industries

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## Top-Ranked U.S. and Canadian Metros



\* Top-performing Mexican states as of 2003, the last year for which data was available.

# Executive Summary

It has been nearly ten years since the Milken Institute first released *America's High-Tech Economy*. During that decade, we watched as the dot-com and technology bubble formed and subsequently popped in 2001. In the aftermath, many felt that technology-based economic development had ceased—but these doubters have been proven wrong. A recovery in high-tech industries began in 2003 and fueled growth once again, a trend that continued through most of 2008.

Communities with concentrations of knowledge-based industries have been able to create high-paying jobs, retain talented individuals, and attract firms from other locations, sparking additional growth. The current economic challenges we face will not leave high-tech sectors unscathed, but they will lead growth once again when we recover.

In this study, we examine the locations and patterns of growth in nineteen individual high-tech industry categories. We then aggregate those results to determine overall high-tech performance. In each category, individual metro areas are then ranked according to their performance as “tech poles.” This benchmarking metric is based on employment and wages; it also looks at the concentration of technology in the local economy and each metro’s relative share of aggregate North American activity.

For this newly updated edition, we have extended the geography of our study to encompass all of North America, including Canada and Mexico. We believe this to be the most detailed comparative assessment available for understanding North America’s high-tech landscape. We can now answer questions such as, “Does Ottawa rank ahead of San Jose in communications equipment?” (Yes) and “Could Baja California lead North America in semiconductor and other electronic components manufacturing?” (Close, but not quite).

## Top-Performing U.S. and Canadian Metros

Because comparable 2007 data was not available for Mexico, our tech pole rankings for metro areas encompass only the United States and Canada. A separate section of our report incorporates state-level high-tech data for Mexico.

① Silicon Valley (the **San Jose–Sunnyvale–Santa Clara, California**, metro area) retains its leadership, placing first on our tech pole index.

Silicon Valley’s unique ecosystem of collaborating agents has an unmatched ability to spawn entrepreneurial firms that create new products, services, and even entire industries, while sustaining major high-tech anchor firms that remain at the leading edge of innovation in their industries. The region’s

## Highlights

- Silicon Valley (the San Jose, California, metro area) remains the preeminent high-tech cluster in North America and the world. Its extensive network of collaborating agents is unparalleled, resulting in a high-tech employment concentration that is four-and-a-half times the average for all metros.
- Seattle’s 2nd-place ranking speaks to its crucial role in the knowledge geography of North America. It employs just 17,700 fewer high-tech workers than Silicon Valley, which had 244,000 in 2007.
- Third-ranked Cambridge places in the top ten in nine separate high-tech industries and has a concentration exceeding the North American average in seventeen industries—an achievement that exceeds even Silicon Valley.
- Washington, D.C., ranks 4th, placing in the top ten in six out of eight high-tech service categories, a better performance on this measure than any other metro area.
- Close behind Washington is 5th-ranked Los Angeles, home to many aerospace and high-end digital special effects jobs.
- Dallas is 6th, followed by San Diego (7th), Santa Ana/Orange County (8th), New York (9th), and San Francisco (10th).
- Toronto is Canada’s highest-ranking tech center, ranking 15th overall with 157,400 high-tech workers in 2007. Montréal was Canada’s second metro to make the top twenty, coming in at 19th. These two metros were the fastest-growing tech centers in the top twenty between 2003 and 2007.
- In order to quantify Mexico’s performance, we compiled a separate set of rankings for 2003, the latest year for which Mexican data are available. In that analysis, the state of Baja California was Mexico’s best performer at 15th place in North America, followed by the Distrito Federal (the Mexico City region) in 19th place.

**Total high-tech results\***  
*Top fifty ranked by 2007 tech pole scores*

Current rank	2003 rank	Metro area	Employment (thousands)	LQ	Share of North American wages	Tech pole scores
1	1	San Jose-Sunnyvale-Santa Clara, CA	244.0	4.6	5.7%	100.0
2	3	Seattle-Bellevue-Everett, WA	226.3	2.7	3.2%	46.4
3	2	Cambridge-Newton-Framingham, MA	163.6	3.4	2.8%	45.2
4	5	Washington-Arlington-Alexandria, DC-VA-MD-WV	275.7	2.0	4.2%	41.8
5	4	Los Angeles-Long Beach-Glendale, CA	376.4	1.6	4.2%	40.2
6	6	Dallas-Plano-Irving, TX	187.7	1.5	2.4%	21.8
7	7	San Diego-Carlsbad-San Marcos, CA	136.4	1.8	2.0%	19.3
8	11	Santa Ana-Anaheim-Irvine, CA	147.0	1.7	1.6%	17.7
9	9	New York-White Plains-Wayne, NY-NJ	262.0	0.9	3.9%	16.8
10	8	San Francisco-San Mateo-Redwood City, CA	106.4	1.8	2.0%	16.1
11	13	Philadelphia, PA	145.4	1.3	1.9%	14.4
12	12	Atlanta-Sandy Springs-Marietta, GA	164.1	1.1	1.9%	14.0
13	10	Edison, NJ	103.5	1.7	1.5%	13.9
14	14	Chicago-Naperville-Joliet, IL	200.0	0.9	2.5%	13.3
15	25	Toronto, ON	157.4	1.1	1.3%	12.5
16	15	Oakland-Fremont-Hayward, CA	98.0	1.6	1.4%	12.1
17	18	Minneapolis-St. Paul-Bloomington, MN-WI	131.0	1.2	1.5%	11.9
18	17	Denver-Aurora, CO	107.5	1.5	1.3%	11.9
19	27	Montreal, QC	128.2	1.3	1.0%	11.8
20	16	Austin-Round Rock, TX	81.5	1.8	1.1%	11.6
21	21	Houston-Sugar Land-Baytown, TX	151.7	1.0	1.9%	11.6
22	29	Huntsville, AL	42.5	3.5	0.4%	10.5
23	20	Phoenix-Mesa-Scottsdale, AZ	124.9	1.1	1.4%	10.4
24	31	Wichita, KS	50.6	2.9	0.5%	10.3
25	23	Bethesda-Gaithersburg-Frederick, MD	67.8	2.0	0.9%	10.2
26	24	Durham, NC	44.4	2.6	0.7%	9.7
27	28	Portland-Vancouver-Beaverton, OR-WA	88.1	1.5	1.0%	9.6
28	19	Boulder, CO	34.0	3.5	0.5%	9.3
29	26	Newark-Union, NJ-PA	84.9	1.4	1.3%	9.3
30	22	Warren-Farmington Hills-Troy, MI	90.6	1.3	1.1%	9.0
31	30	Kansas City, MO-KS	82.2	1.4	0.9%	8.4
32	32	Baltimore-Towson, MD	92.9	1.2	1.1%	8.3
33	35	St. Louis, MO-IL	85.1	1.1	0.9%	6.7
34	44	Salt Lake City, UT	54.8	1.5	0.5%	5.6
35	36	Tampa-St. Petersburg-Clearwater, FL	76.9	1.0	0.7%	5.6
36	64	Vancouver, BC	69.5	1.1	0.5%	5.6
37	66	Ottawa, ON	42.8	1.8	0.4%	5.4
38	34	Raleigh-Cary, NC	45.7	1.5	0.6%	5.3
39	39	Albuquerque, NM	39.3	1.7	0.5%	5.2
40	33	Nassau-Suffolk, NY	71.8	1.0	0.8%	5.1
41	40	Indianapolis, IN	58.9	1.1	0.7%	4.9
42	38	Fort Worth-Arlington, TX	57.5	1.1	0.6%	4.8
43	46	Orlando-Kissimmee, FL	63.6	1.0	0.7%	4.7
44	47	Hartford-West Hartford-East Hartford, CT	48.4	1.3	0.6%	4.7
45	50	Columbus, OH	57.0	1.0	0.6%	4.4
46	45	Pittsburgh, PA	63.3	0.9	0.6%	4.3
47	41	Bridgeport-Stamford-Norwalk, CT	39.0	1.5	0.5%	4.3
48	49	Palm Bay-Melbourne-Titusville, FL	26.3	2.1	0.3%	4.1
49	42	Lake County-Kenosha County, IL-WI	35.0	1.5	0.5%	4.1
50	37	Colorado Springs, CO	27.9	1.8	0.4%	4.0

Sources: BLS, Moody's Economy.com, Statistics Canada.

\*Note: Due to a lack of recent data, Mexico was excluded from these rankings. An analysis of Mexico's state-level performance, based on 2003 data, is found later in this report.

unrivaled absorptive capacity allows it to capture new internally generated knowledge, slowing the inevitable spillover to other regions, and convert it into economically viable entities better than any other location. Its firms see research and development as part of their very DNA; they continue to innovate as part of their core business mission rather than viewing innovation an expense to be minimized in a challenging economic environment, such as the one we are in today.

Stanford University provides cutting-edge research and transfers it, along with top-notch graduates, to the private sector to fuel regional growth. Its alumni are among the most prominent entrepreneurs in the region, founding many of the leading firms. The University of California, Berkeley, and other local institutions also provide high-end human capital. Equally important, the area attracts highly skilled technical talent from around the nation and world.



The San Jose metro area has established itself as the leading node on the international high-tech network, a role it managed to retain even through the restructuring that occurred in the aftermath of the dot-com and tech bubbles. As business costs have escalated in the region, firms have outsourced more functions to other locations while retaining the highest-valued and most creative elements. Many manufacturing activities for more heavily commoditized products were relocated outside the region. This process was not accomplished without substantial pain, as thousands of jobs were lost.

The Sand Hill Road venture capitalists of Silicon Valley travel abroad more often than in the past to places like India, China, and Israel to fund new enterprises and seek partnerships for their stable of companies. This activity has increased the embeddedness of foreign firms into the region. Many foreign-born engineers, software developers, and tech-savvy entrepreneurs have left Silicon Valley and returned to their native countries seeking new, exciting opportunities and leading a wave of technology entrepreneurship. This process is now termed “brain circulation” as opposed to the previous unidirectional “brain drain.” The natural inclination of these innovators is to partner and establish alliances with former colleagues in Silicon Valley.

② The breadth of high-tech activity in the San Jose metro area is shown by its ranking of 1st or 2nd in seven (out of a possible nineteen) individual tech pole indexes for various industries. It places among the top ten in twelve individual categories, and has an employment concentration above the North American average (excluding Mexico) in an impressive sixteen fields. Overall, its high-tech employment concentration is four-and-one-half times the metro average for North America. With a top tech pole index score of 100, it was more than twice as dominant in the North American context as the 2nd-place metro area, **Seattle-Bellevue-Everett, Washington**, which recorded a score of 46.4. San Jose may not overshadow the technology landscape as fully as it did ten years ago, but its position is remarkable.

San Jose was first in the tech pole rankings in computer and peripheral equipment manufacturing, accounting for 17.0 percent of employment and 28.4 percent of wages for that industry in North America. Hewlett-Packard, Sun Microsystems, and Apple are the anchor companies in this field. The metro holds a similarly dominant position in semiconductor and other electronic component manufacturing, as Intel, Advanced Micro Devices, LSI Corp., and many other leading firms are based here. Home to the prominent search engines Google and Yahoo!, it's also the leader in data processing, hosting, and related services. Although Ottawa, Ontario, shot above San Jose to claim the top spot in communications equipment

manufacturing, Silicon Valley remains an important center of influence, with Cisco and other firms.

Seattle's 2nd-place position on the tech pole index speaks to its important role in the knowledge geography of North America. For example, the Seattle metro area employed 226,300 high tech workers in 2007, just 17,700 fewer than San Jose. Seattle owes most of its stellar ranking to software and aerospace.

Microsoft, along with its spin-offs and other start-up firms, has positioned the Seattle metro area as the global center of software. Microsoft employs more than 33,000 workers in the metro area and drives Seattle to a 1st-place ranking on the tech pole index for software publishers. An example of Seattle's dominance in software is that its tech pole score of 100 in this field is followed by a 2nd-place score of only 21.4, posted by the next leading city, Cambridge. Perhaps the most compelling example of its prowess in software can be found in the observation that Seattle captures 23.4 percent of wages in this field in all of North America.

Although it is no longer the corporate headquarters of Boeing, Seattle retains a huge employment base of the firm's operations and related suppliers. Altogether, Seattle employed 76,100 workers in aerospace products and parts manufacturing in 2007. Only Wichita, Kansas, has a higher concentration of aerospace activity. Seattle also ranks among the top ten tech poles in telecommunications and other information services.

③ Part of the Greater Boston metro area, the metro division of **Cambridge-Newton-Framingham, Massachusetts**, is 3rd on the overall tech pole index at 45.2, edged out of 2nd place by just 1.2 index points. Home to world-class research universities such as Harvard and MIT, and the global leader in commercializing and transferring its research to the private sector, the metro area has an ecosystem of technology entrepreneurship that rivals San Jose's. This local talent pool comes from locations all over the planet. The research intensity in the area has enabled Cambridge to be among the elite in generating and growing biotech start-ups, while simultaneously attracting research divisions of large pharmaceutical and biotech firms. It's the birthplace of much of the mainframe computer industry and remains a major player today.

Cambridge is the top-ranked tech pole in scientific research and development services, a category that captures much of its biotech research; this field employed 26,000 local workers in 2007. These activities are nearly eight times more concentrated in the Cambridge area than in North America overall. Biogen IDEC and Genzyme are its two most prominent

self-incubated biotech firms, while the Novartis Institutes for Biomedical Research and Millennium Pharmaceuticals are examples of other major players. The presence of Boston Scientific helps place the metro area among the leaders in navigational, measuring, electromedical, and control instruments manufacturing. Cambridge ranks 2nd on the software tech pole index, makes the top ten in nine individual industries, and has a concentration above the national average in seventeen categories—exceeding even San Jose for top honors in that measure.

**4 Washington-Arlington-Alexandria, DC-VA-MD-WV**, is 4th among tech poles with an index score of 41.8, just ahead of Los Angeles. The area is the North American leader among high-tech services. Overall, firms in the Washington metro area employed 275,700 high-tech workers, creating double the North American concentration in 2007. Washington places in the top ten in six out of eight high-tech service categories. The presence of the federal government generates the need for massive data-processing support and attracts defense and aerospace contractors. Additionally, Washington's workforce is one of the most educated in the United States.

Washington leads in computer systems design and related services, where it has more than five times the concentration found in North America overall; this field employed 127,000 workers in 2007. In this sector, it is twice as dominant as 2nd-place San Jose on the tech pole index. As a telecommunications hub and a large Internet presence, it has gained an important competitive advantage by creating economies of scale due to high local demand. Computer systems design is now the largest non-government sector in the metro area; the Computer Science Corporation itself employs more than 11,000. IBM has a major footprint as well. Washington is 3rd in scientific research and development services, where biotech and other research in the hard sciences are captured. The National Institutes of Health (NIH) and its spin-offs in the biotech area aid the metro area's performance.

**5 Los Angeles-Long Beach-Glendale, California**, ranks 5th on the tech pole index at 40.2, courtesy of its still vast aerospace footprint and the technology-intensive segment of the motion picture industry. The area has a large research base, with leading institutions such as the California Institute of Technology (Cal Tech), UCLA, and USC. Combined, they provide the area with outstanding medical research expertise, especially in biotech.

Los Angeles is the top tech pole for navigational, measuring, electromedical and control instruments manufacturing. This sector employed 36,200 local workers in 2007. Los Angeles is the headquarters of Northrop Grumman, and Boeing

retains major operations in the area. The metro area is 5th in aerospace and products and parts manufacturing, with 38,000 jobs. Clearly, the inclusion of motion picture and video in our definition of high-tech industries boosts L.A.'s position in the tech pole rankings, but this categorization is justified in order to capture high-end special effects and post-production talent. Los Angeles has 31.8 percent of North American employment in motion pictures.

**6 The Dallas-Plano-Irving, Texas**, metro division is 6th on the overall tech pole index. Its high-tech strengths lay in ICT hardware and data processing services. Overall, with 187,700 high-tech workers and a concentration 50 percent above the North American average in 2007, the metro area is an important player globally as well.

Dallas is 2nd in telecommunications, with major operations of Verizon and the new AT&T consolidating its corporate headquarters in the region. Placing 3rd in communications equipment manufacturing, the metro is renowned for its Dallas-Richardson telecom corridor. With Texas Instruments as its anchor, it places 6th on the semiconductor and other electronic component manufacturing tech pole index. The University of Texas, Dallas, has an outstanding engineering program that provides homegrown talent to fuel growth in these sectors. Dallas moved to 2nd, up from 3rd in 2003, in data processing, hosting, and related services. A number of data processing centers are located here, with Electronic Data Systems being the primary anchor.

**7 San Diego-Carlsbad-San Marcos, California**, is an important high-tech center with the world's most geographically dense biotech cluster, an enviable position in telecom hardware and services, and strong representation in several fields. San Diego had 136,400 high-tech jobs and was more than 80 percent more dependent on technology than the average for North America in 2007. The metro area placed in the top ten in four of the individual high-tech sectors and had a concentration above the North American average in fourteen categories.

San Diego's biotech network is closely knit and includes a wide range of members. The research milieu includes The Scripps Research Institute, the Salk Institute for Biological Studies, the Burnham Institute, and the University of California, San Diego. Its research institutes and firms receive a disproportionate share of NIH funding, National Science Foundation basic research funding, Small Business Innovation Research Awards, and Small Business Technology Transfer awards in biotech research. The metro is home to large biotech firms such as Amylin Pharmaceuticals and many mid-sized and start-up firms. Qualcomm is the key player in the communication chips area, and AT&T has a major presence in the telecommunications space.

**8** North of San Diego, **Santa Ana–Anaheim–Irvine (Orange County, California)** is 8th on the tech pole index, a climb of three places from 2003. Medical equipment manufacturing; medical and diagnostic labs; and measuring, electromedical and control instruments manufacturing are key drivers of high-tech growth. Santa Ana ranks among the top ten in six individual categories and exceeds the North American concentration in sixteen—tying San Jose for 2nd place in this measure. Additionally, Broadcom is a key player in communication chips.

**9** Part of the Greater New York area, the metro division of **New York–White Plains–Wayne, New York–New Jersey**, places 9th on the overall tech pole list. It is aided by its large absolute size, of course, but with 262,000 high-tech workers, it's hard to ignore. As an important entertainment hub, New York is 2nd only to Los Angeles in motion pictures and video industries. It is a key location of Internet portals and places 3rd in other information services.

**10** **San Francisco–San Mateo–Redwood City, California**, remains in the top ten in 2007, slipping two positions from its 8th-place finish in 2003. The bursting of the dot-com bubble impacted San Francisco more than any other region in North America, but the creativity of its entrepreneurs and its highly skilled workforce allows the region to constantly reinvent itself. It is the “birthplace of biotech,” and indeed, biotech heavyweight Genentech emerged out of locally based university research. It ranks 5th among software publishers, with major operations of Electronic Arts and Oracle. San Francisco is a major hub of data processing, hosting, and related services, where it ranks 7th, and of computer systems design and related services. Within high-tech services, it ranks just behind Washington.

**11** The **Philadelphia, Pennsylvania**, division of the Greater Philadelphia metro area is 11th on the tech pole index, rising two slots from its 2003 position. The area serves as a base to a whole host of pharmaceutical companies, including Merck, Wyeth, and GlaxoSmithKline, as well as biotech firms such as Cephalon. Philadelphia ranks 7th in scientific research and development services, up from 14th in 2003, courtesy of rapid growth in biotech. Philadelphia is strong in medical devices as well.

**12** **Atlanta–Sandy Springs–Marietta, Georgia**, is 12th on the tech pole index. It ranks 1st in telecommunications, edging out Dallas for the distinction. AT&T's Mobility division is the biggest player in telecommunications; in total, the sector employs 37,900 local workers in Atlanta. The metro area has seven individual high-tech sectors that are more concentrated than the North American average.

**13** **Edison, New Jersey**, ranked 13th in 2007. It placed 3rd in pharmaceutical and medicine manufacturing, with 16,800 workers and major players such as Bristol-Myers Squibb and Johnson & Johnson. Edison is a top-ten performer in telecommunications as well.

**14** The **Chicago, Illinois**, division of the Greater Chicago metro area finished 14th in 2007. It ranks among the top ten in telecommunications and computer systems design and related services. Altogether, some 200,000 local workers were employed in high-tech industries in 2007. Motorola in the telecom space and Abbott Labs in pharmaceuticals are its two biggest high-tech firms.

**15** **Toronto, Ontario**, is Canada's highest-ranking tech center, coming in at 15th. With 157,400 local jobs, its high-tech sector is the 10th largest in all of North America in terms of absolute size. The region scores among the top ten in a number of high-tech industries—namely, manufacturing and reproducing of optical media, biopharmaceuticals, and medical and diagnostic laboratories. The metro area has nurtured a thriving film cluster as well. Toronto has been a magnet for high-end technical and creative talent from around the world.

Additionally, the Canadian data show that Toronto jumped ten places from 2003. It scores high on the biopharmaceutical tech pole index, with more than 11,000 employed in the sector. Major players in the region include GlaxoSmithKline and Apotex. Private-public research collaborations involving the University of Toronto and McMaster University have propelled the metro's emergence as an attractive place for biopharmaceuticals. Toronto is Canada's leading center of computer systems design and related services, a category in which it ranks 8th in North America.

**16** **Oakland–Fremont–Hayward, California**, is 16th on the tech pole index for 2007. Although it doesn't record a top-ten finish in any of the nineteen high-tech categories, it achieved a strong ranking overall by having a concentration exceeding the North American average in sixteen of them. Centered in proximity to Berkeley, it has a number of biotech firms and its major tech employers include Oracle and Sybase.

**17** Placing 17th on the tech pole index in 2007, **Minneapolis–St. Paul–Bloomington, Minnesota–Wisconsin**, owes its position to medical devices giants Medtronic and Boston Scientific. Overall, Minneapolis has a higher concentration than North America in nine high-tech categories.

**18** **Denver–Aurora, Colorado**, comes in at 18th place on the tech pole index and is 4th in telecommunications. Anchor firm Qwest Communications is the largest employer in the metro area. It has a greater concentration in nine of the high-tech categories than the North American average.

**19 Montréal, Québec**, Canada's second metro to make the top twenty, comes in at 19th place, gaining eight spots since 2003. Montréal boasts more than 127,000 high-tech jobs, with aerospace as a primary strength. Bombardier, along with Pratt & Whitney, is a significant driver of the sector's growth. Bombardier is headquartered in the metro, accounting for many of the nearly 21,000 aerospace-related jobs here. Montréal's aerospace cluster is widely supported though its formidable research capacity, as evidenced by its 197 research centers and four major universities.

**20 Austin–Round Rock, Texas**, a poster child for the concept of a 21st-century knowledge-based community, rounds out the top twenty. Among high-tech industries, its highest concentration is in computer and electronic product manufacturing; it is four-and-a-half times more dependent on this sector than North America overall. Dell is the major computer manufacturer, along with IBM; electronic component firms Applied Materials, Advanced Micro Devices, Flextronics, Samsung Austin Semiconductor, and others play a major role in the area's economy.

## Mexican States

In order to create a complete set of rankings within the North American context that includes Mexico, we had to utilize information gathered at the state level to develop comparable high-tech industry data. Mexican data was only available through 2003, so we place Mexican states among U.S. and Canadian metros for comparative purposes. Using state-level data pushes up total employment and wages for Mexican locations, but it also reduces the overall concentration of jobs in each sector, as the entire state (not just the leading city) must be considered.

**Baja California**, which occupies the northern half of the Baja California peninsula (and includes the cities of Tijuana, Mexicali, and Ensenada), is the top-ranking Mexican state in the 2003 tech pole index, which includes all three nations. Placing 15th, it recorded total high-employment of 104,000 in 2003. Foreign firms were attracted by the Maquiladora Decree of 1989, which granted them complete ownership of their facilities provided they leased the land if it was located near the borders or coast, and provided that the products manufactured were to be exported. Because most products of these factories are intended for export to the United States or Canada, they are located in industrial zones close to the U.S. border, and Baja California is a clear beneficiary of this trend. The region was the top tech pole in audio and video equipment manufacturing.

Firms such as Casio, Honeywell, Sanyo, and Sony have electronic components factories in Baja California, boosting the area to 2nd place (after San Jose) on the tech pole ranking for the manufacturing of semiconductors and other electronic components. Baja's concentration of employment in this category actually exceeds San Jose, although it is largely made up of lower-value manufacturing.

Baja California led North America in medical equipment and supplies manufacturing, with 22,200 workers; it was

more than sixteen times more dependent on this activity than the North American average in 2003. In 2003, Baja California's medical product cluster was home to sixty different companies, of which more than forty were divisions of U.S. firms. Of those, thirteen were actually subsidiaries of San Diego-based companies or corporate divisions. Communications equipment was another area where Baja California was in the top ten. Overall, Baja California has more than three times the concentration of high-tech employment as in North America overall.

The **Distrito Federal**, which encompasses Mexico City and its immediate surrounding area, is the second-ranking Mexican state, placing 19th overall in North America in our 2003 tech pole index. The Distrito Federal was the top telecommunications performer in North America in 2003. The industry is highly concentrated in Mexico City due to the monopoly of Telefonías de México (Telmex). The concentration of telecommunications in the region is nearly three-and-one-half times greater than all of North America and its employment level (82,100) was nearly double the 2nd-ranking area (Atlanta).

The Distrito Federal ranks 6th in pharmaceutical and medicine manufacturing in North America, with 33,700 local workers (more than any U.S. or Canadian metros). In addition to the presence of Mexican pharmaceutical manufacturers, the state is also home to several foreign firms. Abbott Labs of the United States and the German firm Bayer each employ more than 2,500 workers in the state. Filmmaking is also highly concentrated around Mexico City, resulting in its 6th-place ranking in North America. The ability to export Mexican film and television products to other parts of Latin America as well as a large home market has given the industry cluster around Mexico City a comparative advantage. Employment in this field is actually the third-largest of any of the locations on the list.